REMARKS

Claims 1-23 were pending in the Action, and these claims remain pending upon entry of the present paper. The present paper adds claims 24 and 25, and Applicants submit that the addition of these claims does not introduce new matter to the specification, as support may be found, among other places, at pages 21-34 and Fig. 4 of Applicants' specification.

In the Action, claims 1-7 and 15-18 stand rejected under 35 U.S.C. 103(a) as being unpatentable over *Binns* (U.S. Pat. No. 6,189,022); and claims 8-14 and 19-23 stand rejected under 35 U.S.C. 103(a) as being unpatentable over an alleged combination of *Binns* with *Imanishi et al.* (U.S. Pat. No. 6,243,735). These grounds of rejection are addressed below.

Independent claim 1, and Dependent claims 2-7

Original independent claim 1 recites, among other features, the steps of: "storing a schedule list of time entries for a plurality of periodic events, wherein one or more of said periodic events is to occur at one or more times represented by said list of time entries; receiving a registration request for a new periodic event from a process, wherein said registration request includes period time data for said new periodic event; comparing said period time data with said schedule list to determine whether said new periodic event can occur at one or more of said times represented by said schedule list of time entries; and modifying said schedule list of time entries responsive to said step of comparing."

In rejecting claim 1, the Action relies on *Binns* As noted by the Action, *Binns* describes a table (Table A) showing a number of tasks, together with their "untransformed" and "transformed" periods (T), a criticality level (r) and slack-level (sl). *See, e.g., Binns,* col. 3, line 49 to col. 4, line 9.

Although *Binns* is the only reference cited in the Action for this rejection, the Action concedes that *Binns* does not show the claimed step of "receiving a registration request for a new periodic event from a process, wherein said registration request includes period time data for said new periodic event." Action, p. 3. The Action alleges that it would have been obvious to one of ordinary skill to modify *Binns* to perform such a step, based on the allegations that: 1) "it is well known in the art at the time the invention was made to schedule a new processes and register the information regarding the new process at times when a new process is added to the list of periodic processes for the reason that new processes be scheduled when they arrive and be given a chance to be scheduled;" and 2) "[i]t is also well known in the art that time data be included in the request when a request for a scheduling process is submitted, for the reason that any Therefore [sic] ...." Action, p. 3. Since the remainder of this last sentence is missing from the Action, Applicants cannot be certain as to the Action's basis for modifying *Binns*. Applicants note, however, that *Binns* focuses its attention on incremental and design-to-time processes, with no teaching or suggestion that a "registration request for a new periodic event from a process" is desirable, or even possible. Accordingly, Applicants respectfully dispute, pursuant to MPEP §2144.03, the Action's allegations regarding the existence of the allegedly well-known features, and the motivation to modify *Binns* to include these allegedly well-known features. If this ground of rejection is to be maintained, Applicants request, pursuant to MPEP §2144.03, that the subsequent action provide support for these allegations, and that the subsequent action (if it contains rejections) be made non-final, so that Applicants may have the opportunity to fully respond to the Action's position.

Another aspect of Applicants' novel method involves the "period time data for said new periodic event," and the step of "comparing said period time data with said schedule list to

determine whether said new periodic event can occur at one or more of said times represented by said schedule list of time entries." To show this step, the Action relies on the admittedly absent but allegedly well-known features discussed above, and further alleges that once *Binns* is modified to include those allegedly well-known features, the discussion at *Binns* col. 4, lines 41-65 would result in the claimed step. Action, p. 3. Applicants respectfully disagree.

In that cited portion, *Binns* describes a four-step process of applying "slack stealing" to an untransformed incremental process[1] that requests an increment in processing time. First, the *Binns* system looks up the amount of slack time available from each scheduled task. *Binns*, col. 4, lines 58-61. Then, the *Binns* system subtracts the amount of slack time that has already been distributed to other incremental or design-to-time processes, and to idle time, from the slack times in the first step. *Binns*, col. 4, lines 61-65. Third, the *Binns* system chooses the smallest slack value that will still permit lower-numbered priority[2] processes to meet their deadlines, and if there is enough slack time for the requested increment, the request is granted. *Binns*, col. 4, line 67 to col. 5, line 4. *Binns* checks to see how much slack time is available, to determine how much unused time can be distributed. *Binns* does not, however, teach or suggest comparing period time data with a schedule list to determine whether a new periodic event can occur "at one or more of said times represented by said schedule list of time entries." Even assuming, *arguendo*, that *Binns* could somehow have been modified to incorporate the missing step of "registration," *Binns* still would not perform this step of comparing.

For at least the reasons set forth above, Applicants submit that original independent claim 1 distinguishes over *Binns*. The other reference cited in the Action, *Imanishi et al.*, does not

[1] As noted in *Binns*, an "incremental" process is a process that can request additional execution time at run-time, while a "design-to-time" process similarly adjusts the size of the "problem" it addresses based on the amount of time available at run time. *See, e.g., Binns* col. 1, liens 15-22 and 29-34.
[2] "the smaller the ranking, the higher the priority" *Binns*, col. 6, lines 27-28.

overcome the deficiencies identified above with respect to *Binns*, and Applicants submit that claim 1 is in condition for allowance. Claims 2-7 depend from claim 1, and are distinguishable for at least the same reasons as claim 1, and further in view of the various advantageous and novel features recited therein. For example, claim 4 recites "[t]he method of claim 1, wherein said step of modifying includes the step of storing an indication that said new periodic event is to occur at one or more of said one or more times represented by said schedule list of time entries." The portion of *Binns* cited in the Action merely discusses the fact that incremental processes have a worst case execution time and an optional component, and provides no teaching or suggestion at all of storing any such indication that a new periodic event "is to occur at one or more of said one or more times represented by said schedule list of time entries."

As another example, claim 6 recites "[t]he method of claim 5, wherein said step of modifying further includes the step of extending said schedule list of time entries such that a last entry in said schedule list is a common multiple of a plurality of periods of said plurality of periodic events." The Action cites *Binns* Fig. 3 for its depiction of "transformed with slack stealing between 9-10, 10-11 and 11-12." It is unclear to Applicants which of these is alleged to correspond to the "last entry" recited in this claim. Moreover, the *Binns* description of Fig. 3 makes clear that nothing in that figure shows, teaches, or suggests the claimed "common multiple of a plurality of periods of said plurality of periodic events." Indeed, the description of that figure states that *Binns* would "recommend that each baseline time slice be allocated all available slack at the priority of the time slice plus the worst case time slice execution time," with no suggestion at all of any "common multiple." *Binns*, col. 7, lines 2-4 (emphasis added). Furthermore, the *Binns* figure does not depict any "extending" of any such schedule list, as also recited in claim 6.

Independent Claim 15, and Dependent Claims 16-18

Original independent claim 15 recites, among other features, the steps of: storing a schedule list of time entries corresponding to a plurality of periodic events; receiving a request to schedule a new periodic event, wherein said request includes a minimum time parameter and a maximum time parameter; assigning said new periodic event to a first entry in said schedule list if both said minimum time parameter and said maximum time parameter are wildcard values; assigning said new periodic event to a first entry in said schedule list if said minimum time parameter is a wildcard value, and said maximum time parameter is greater than or equal to a time value in said first entry in said schedule list; and assigning said new periodic event to a last entry in said schedule list if said maximum time parameter is a wildcard value, and said minimum time parameter is less than or equal to a time value of said last entry.

The Action relies on the same analysis of *Binns* to reject claim 15 as was used to reject claim 1. In making that rejection, the Action already concedes that *Binns* "fails to explicitly tech [sic] of 'receiving a registration request for a new periodic event from a process, wherein said registration request includes period time data for said new periodic event.'" Action, p. 3. The Action goes on to allege that certain features were well-known, but the Action never suggests that the claim 15 feature "wherein said request includes a minimum time parameter and a maximum time parameter" was well-known or disclosed by any reference. Neither of the cited references discloses this feature. For example, *Binns* states that "[e]very periodic process stream τ_i has a fixed period T_i which is the time between dispatches, ..." while *Imanishi et al.* focuses its discussion on the hardware aspects of a microcontroller, with no teaching or suggestion of such a feature. *See, e.g., Binns* col. 2, lines 38-39 (emphasis added); *and Imanishi et al.*, col. 1, lines 43-62.

Applicants note that, in rejecting a different claims (claims 8-14 and 19-23), the Action does allege that the *Binns* "minimum amount of time to produce an acceptable suboptimal result," "maximum execution time," and "slack value" show a "minimum time parameter," "maximum time parameter," and "wild card value." Action, p. 6. Such a rejection cannot stand in light of the language in the claims. For example, claim 15 includes steps performed "if both said minimum time parameter and said maximum time parameter are wildcard values," "if said minimum time parameter is a wildcard value ..." or "if said maximum time parameter is a wildcard value ...." Under the Action's interpretation of *Binns*, these would correspond to actions taken when "both said [minimum amount of time to produce an acceptable suboptimal result] and said [maximum execution time] are [slack values];" "if said [minimum amount of time to produce an acceptable suboptimal result] is a [slack value] ..." and "if said [maximum execution time] is a [slack value] ...." In the context of *Binns*, these alternatives make no sense. The slack value is a ranking (e.g., from 1-3) and a priority having no unit of measurement, and can never "be" a maximum or minimum execution time. *See Binns*, col. 3, lines 56-59. The Action maps individual terms in isolation, devoid of context of the *Binns* patent, and does not result in the obviousness of Applicants' claims.

Furthermore, there is no teaching or suggestion in *Binns* that the worst case time slice execution time is included in "a request to schedule a new periodic event" (the Action already admitted that the request was not shown in *Binns*), or that this execution time may be a "wildcard value," as recited, among other features, in original independent claim 15.

Applicants submit that original independent claim 15 is distinguishable over the cited references, and is in condition for allowance. Claims 16-18 depend from claim 15, and are allowable for at least the same reasons as claim 15, and further in view of the various

advantageous and novel features recited therein. For example, claim 16 recites the additional steps of "adding a new entry to said schedule list if said minimum time parameter is a wildcard value and said maximum time parameter is less than a time value of said first entry in said schedule list; and extending said schedule list until a last entry in said list is a common multiple of a plurality of periods for said plurality of periodic events." The Action cites *Binns* Fig. 3 to show these additional features, but this figure teaches nothing regarding the "minimum time parameter" being a "wildcard value," the "first entry in said schedule list," or the step of "extending." Indeed, Fig. 3 does not appear to extend any list at all.

As another example, dependent claim 17 further recites: "adding a new entry to said schedule list if said maximum time value is a wildcard value and said minimum time value is greater than a time value of a last entry in said schedule list, wherein said new entry includes a time value that is an integer multiple of a time value in said last entry in said schedule list; and extending said schedule list until a last entry in said list is a common multiple of a plurality of periods for said plurality of periodic events." The Action once again cites *Binns* Fig. 3 for these additional features, and Applicants note that the cited Figure teaches nothing about a "maximum time value" being a "wildcard value," the "last entry in said schedule list," or the step of "extending."

Original Independent Claim 8, and Dependent Claims 9-14

Original independent claim 8 recites, among other features, a computer-readable medium having computer-readable instructions for performing the following steps: "storing, in a memory, a schedule list having a plurality of time entries indicating times at which a plurality of critical processes are to be checked to determine whether said critical processes remain active, wherein said time entries in said schedule list are synchronized; using said schedule list to periodically

verify that said critical processes remain active; and taking corrective action when one of said critical processes no longer remains active."

In rejecting claim 8, the Action initially relies on the alleged modification of *Binns* discussed above (to which Applicants have the same objections regarding the allegations of what was "well-known" in the art), but the Action then concedes that *Binns* fails to disclose nearly every feature recited in the claim. Specifically, the Action admits that *Binns* fails to teach "processes are to be checked to determine whether said critical processes remain active, wherein said time entries in said schedule list are synchronized; using said schedule list to periodically verify that said critical processes remain active; and taking corrective action when one of said critical processes no longer remains active." Action, p. 5. The Action cites *Imanishi et al.* for these missing features, but as will be discussed below, *Imanishi et al.* does not teach or suggest these claim 8 features.

Imanishi et al. relates generally to a system that uses hardware, as opposed to a software routine, to control the switching of tasks among a plurality of hardware engines. *Imanishi et al.*, col. 1, lines 44-46. *Imanishi et al.* describes a system having five different hardware engines, which *Imanishi et al.* refers to as "cores." *Imanishi et al.*, col. 2, line 60 to col. 3, line 2. When one of these cores finishes its assigned task, the *Imanishi et al.* system uses a task management table 310 to determine which task that core should handle next. *Imanishi et al.*, col. 5, lines 5-12. The identification of the next task is done by the priority encoder 333, which selects the highest priority task that is in a READY state. *Imanishi et al.*, col. 5, lines 12-13; and col. 7, lines 20-22.

Although *Imanishi et al.* does describe the state transitions of the various tasks (i.e., as being in the STOP, READY, ACTIVE or SLEEP states – col. 5, lines 48-54), it makes no mention at all regarding how frequently (or infrequently, or if at all) these tasks are checked to

confirm their state. In fact, the state transition diagram in *Imanishi et al.* Fig. 5 simply assumes that once a task enters a state, it stays in that state until further notice. In the specification, *Imanishi et al.* uses software instruction calls to change a task's state, without any discussion of checking to see if the task is still in the assigned state. *Imanishi et al.*, col. 5, line 55 to col. 6, line 5. *Imanishi et al.* contains no description of checking to determine whether a particular task remains in a particular state, and does not disclose, teach, or suggest "a schedule list having a plurality of time entries indicating times at which a plurality of critical processes are to be checked to determine whether said critical processes remain active," as recited, among other features, in claim 8. For the same reasons, *Imanishi et al.* also fails to teach or suggest the step of "using said schedule list to periodically verify that said critical processes remain active."

For at least the reasons above, original independent claim 8 distinguishes over the cited art, and is in condition for allowance. Claims 9-14 depend from claim 8, and are allowable for at least the same reasons as claim 8, and further in view of the various advantageous and novel features recited therein. For example, claim 9 recites the additional steps of "sending a first signal to a first critical process at a first time in said schedule list; waiting for a second time in said schedule list, wherein said second time corresponds to said first critical process; at said second time, determining whether a response to said first signal was received from said first critical process; resending said first signal to said first critical process if said response was received; and taking corrective action if said response was not received from said first critical process." The Action cites *Imanishi et al.* col. 2, line 58 to col. 3, line 10 and col. 4, lines 39-68 for these steps. The cited portion describes how the *Imanishi et al.* task manager issues instructions to the cores to begin tasks, but does not teach or suggest the claim 9 features. For example, the cited portion (and all of *Imanishi et al.*, for that matter) does not describe

"resending said first signal to said first critical process if said response was received," or "taking corrective action if said response was not received from said first critical process."

Independent Claim 19, and Dependent Claims 20-23

Original independent claim 19 recites, among other features, "a memory storing a plurality of computer-executable instructions for a plurality of processes to be executed on said processor, and a schedule list having entries of time information and event identification information, wherein said schedule list is used by a first one of said plurality of processes to monitor one or more of said plurality of processes." The features of the claim 19 device allow it to achieve more reliable operation in certain embodiments.

To reject claim 19, the Action refers back to the rejection of claim 1 (which did not cite *Imanishi et al.*), and refers to *Imanishi et al.* to show "monitoring the status information of the other processes." At the outset, *Imanishi et al.* does not describe any process for monitoring one or more processes. As noted above, the *Imanishi et al.* system simply assumes that a process is whatever state it was last told to take. Furthermore, the combination of *Binns et al.* and *Imanishi et al.*, even if proper, would not result in "a schedule list having entries of time information and event identification information, wherein said schedule list is used by a first one of said plurality of processes to monitor one or more of said plurality of processes," since *Imanishi et al.* has no process for monitoring processes, and certainly would not use any "list" found in *Binns* for this nonexistent purpose.

Applicants respectfully submit that claim 19 is distinguishable over the cited art, and is in condition for allowance. Claims 20-23 depend from claim 19, and are allowable for at least the same reasons as claim 19, and further in view of the various advantageous and novel features recited therein. For example, claim 21 recites "[t]he device of claim 20, wherein said first one of

said processes is a critical process monitor, and said one or more of said plurality of processes includes a critical process." To show this feature, the Action cites the *Imanishi et al.* mention of a critical process at col. 1, lines 43-61. Although *Imanishi et al.* does mention critical processes, it has no mechanism for monitoring such processes, and lacks a teaching or suggestion of a "critical process monitor."

New Independent Claim 24 and Dependent Claim 25

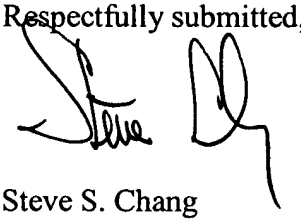
Applicants submit that newly-added claims 24 and 25 are also distinguishable over the art of record. Independent claim 24 recites the steps of "maintaining a schedule list of processes to be monitored, said schedule list including one or more entries identifying one or more times at which said processes are to be monitored; receiving a request to add a new entry to said list, wherein said request includes an identification of a new process to be monitored and a frequency with which said new process is to be monitored; and synchronizing said new entry with one or more entries on said schedule list such that said new process is monitored at times synchronized with said one or more entries," and this method is neither taught nor suggested by any of the cited references, alone or in combination. Claim 25 depends from claim 24, and is allowable for at least the same reasons as claim 24, and further in view of the advantageous and novel features recited therein. Claim 25 recites "[t]he method of claim 24, wherein said step of synchronizing includes the step of determining whether said frequency corresponds to said one or more entries in said schedule list."

Conclusion

For at least the reasons set forth above, Applicants respectfully submit that claims 1-25 are distinguishable over the art of record, and are in condition for allowance. Should the Examiner feel that further discussion and/or amendment would be necessary to place the

application in condition for allowance, the Examiner is invited to telephone the Applicants' undersigned representative at the number appearing below.

Respectfully submitted,



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